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(54) [Title of the Invention] WINDING-AROUND TYPE
TRANSMISSION MEMBER CASE AND METHOD OF PRODUCING THE SAME

(57) [Abstract]

[Object] To eliminate faults called "welds" having a linear pattern, improve the appearance, enhance commercial value, and solve a cause of the generation of cracks, and realize the after-mounting.

[Solving Means] In a case 1 which covers the outer (front) surface of the winding-around type transmission member of a bicycle or tricycle, the case being made from a synthetic resin, a notch 3 is provided, which extends from a part of a insertion hole 10 to the outside edge of the case, the insertion hole for a crankshaft or the like being formed in the center of a front gear covering portion 6.

[Claims]

[Claim 1] A winding-around transmission member case which covers the outer (front) surface the winding-around type transmission member of a bicycle or tricycle, the case being made from a synthetic resin, characterized in that the main part of the case is provided with a notch extending from a part of a insertion hole to the outside edge of the case, the insertion hole for a crankshaft or the like being formed in the center of a front gear covering portion.

[Claim 2] A winding-around type transmission member case according to Claim 1, characterized in that a closing member is detachably attached to the notch of the case body.

[Claim 3] A winding-around transmission type member case according to Claim 1 or 2, characterized in that the notch of the case main part is set at such a size that a crank having a pedal attached thereto and being built in the body of the bicycle or tricycle can be inserted through the insertion hole from the outside of the case.

[claim 4] A winding-around type transmission member case according to Claim 1, 2, or 3, characterized in that one of the case main part and the closing member is provided with a locking portion, and the other is provided with a locked portion.

[Claim 5] A method of producing the winding-around transmission member case specified in Claim 1, in which

synthetic resin melt is injected in a cavity for forming a case main part, the cavity being defined by a female die and a male die, characterized in that one of a core and a core portion of the female-male dies for forming an insertion hole for a crankshaft or the like in the front gear covering portion is provided with a core part for forming a notch extending from a part of the insertion hole to the outside edge of the case, and the synthetic resin melt is caused to flow around the core or the core portion of the female-male dies in such a direction that the resin melt is prevented from colliding with itself in opposition.

[Detailed Description of the Invention]

[0001]

[Technical Field of the Invention] The present invention relates to a case for covering the outer side-surface of a winding-around type transmission member of a pedal cycle such as a bicycle, a tricycle, or the like, and to a method of producing the same.

[0002]

[Description of the Related Art] Figs. 19 and 20 show a conventional half-face case 41 for a pedal cycle or the like. The case 41 is made from a synthetic resin (e.g., ABS, PP, polycarbonate resins, nylon, or the like), and contains a gear covering portion 42 for cover the outer side of a front gear, and chain covering portions 43 and 44 which are

extended backward from the gear covering portion 42, and cover the upper and lower chain-running zones. An insertion hole 45 for a crank shaft or the like is formed in the center of the gear covering portion 42.

[0003] Flanges 46 are formed on the outer peripheries of the gear covering portion 42 and the chain covering portions 43 and 44. The flanges 46 are bent toward the inner side, that is, toward the chain side. The case 41 is integrally molded by an injection molding method. An injection port (gate) for synthetic resin melt is positioned corresponding to the center in the longitudinal direction of the case. As shown in Fig. 21, in a metallic mold 47 for molding the case 41, a female die 48 and a male die 49 form a cavity 50. A core 51 for forming the insertion hole 45 for a crank shaft or the like is fitted in.

[0004]

[Problems to be Solved by the Invention] According to the above-described conventional techniques, in the case injection-molding process, resin melt flows around the core 51 for forming the insertion hole 45. The resin flows become opposed to each other, and collide with each other on the front side of the insertion hole 45. When the resin melt is cooled to be solidified, faults called "welds" 52 (shown by solid lines in Fig. 19) having a linear shape are generated. The welds 52 deteriorate the appearance of the

product, and thus, reduce the commercial value. Moreover, the weld 52 will cause the formation of cracks, and thus, the service life of the product is not assured.

[0005] In view of the above-described practical state, the present invention has been devised. It is an object of the present invention to provide a case for a winding-around type transmission member, which has no faults called "weld", has sufficient appearance and a high commercial value, can eliminate the cause of the crack-generation and enhance the service life, and can be easily attached even after a crank or the like is fixed to the body of a pedal cycle, and to provide a method of producing the case.

[0006]

[Means for Solving the Problems] According to the present invention, the following technical means has been devised to achieve the above-described object. That is, the winding-around type transmission member case of the present invention, which covers the outer (front) side of the winding-around type transmission member of a bicycle or tricycle, the case being made from a synthetic resin, is characterized in that the main part of the case is provided with a notch extending from a part of an insertion hole to the outside edge of the case, the insertion hole for a crankshaft or the like being formed in the center of a front gear covering portion. In this case, no welds are generated

when injection molding is carried out. A case having a good appearance and high qualities can be obtained.

[0007] In the case of the present invention, a closing member may be detachably attached to the notch portion of the case main part. According to this structure, the case has a strength comparable to that of a conventional case, the design property is good, and different colors may be combined for the closing member and the case main part, and thus, high aesthetical effect can be obtained. Moreover, in the case of the present invention, the notch of the case main part may be set at such a size that a crank having a pedal attached thereto and being built in the body of the pedal cycle can be inserted through the insertion hole from the outside of the case. Thereby, the case main part can be after-mounted to the body of the pedal cycle. The case main part be removed from the body of the pedal cycle, while the pedal is not removed.

[0008] Moreover, in the case of the present invention, one of the case main part and the closing member is provided with a locking portion, and the other is provided with a locked portion. According to this structure, the closing portion can be detached to or attached from the case main part easily, efficiently, and in a short time. In this case, the locked portion may be a hook-shape protuberance, and the locking portion may be a locking hole. The closing member

may be attached to or detached from the case main part by means of bolts and nuts or other connecting metallic tools.

[0009] The method of producing the winding-around type transmission member case specified in Claim 1 of the present invention, in which synthetic resin melt is injected in a cavity for forming a case main part, the cavity being defined by a female die and a male die, is characterized in that one of a core and a core portion of the female-male dies for forming an insertion hole for a crankshaft or the like in the front gear covering portion is provided with a core part for forming a notch extending from a part of the insertion hole to the outside edge of the case, and the synthetic resin melt is caused to flow around the core or the core portion of the female-male dies in such a direction that the resin melt is prevented from colliding with itself in opposition.

[0010] According to this production method, the synthetic resin melt flows, in a uni-direction, around the core or the core portion for the formation of the insertion hole for a crankshaft or the like. Thus, the resin melt is prevented from colliding with itself in opposition. Thus, the generation of welds can be completely eliminated. The front gear covering portion having uniform properties can be formed. Thus, a high quality case can be obtained. In this case, preferably, an injection port, i.e., a gate for

injecting synthetic resin melt into the cavity is set at a position in the center of the cavity, since the gate-balance is good, or is set at such a position in an end portion of the cavity that the resin melt flows around the core or core portion in a uni-direction.

[0011]

[Embodiments] Hereinafter, an embodiment of the present invention will be described with reference to the drawings. Figs. 1 to 8 shows a first embodiment of the winding-around type transmission member case of the present invention, particularly, a pedal-cycle half-face chain case 1. Fig. 4 shows the state in which the case 1 is mounted on the body 1 of the pedal-cycle.

[0012] The half-face chain case 1 is formed by injection-molding ABS, PP, polycarbonate, nylon, or the like. The case 1 comprises a case main part 1A and a detachable closing-member 1B for evenly closing a notch 3 formed in the case main part 1A on the outer side of the case 1. As shown in Fig. 4, the case main part 1A comprises a gear-covering portion 6 which has a partially notched circular shape, and covers the outer side of a front gear (large gear) 5 fixed to the body 2 of a pedal cycle via a crankshaft 4, and a chain-covering portion 9 which extends backward from the gear-covering portion 6, and cover the outer side of the upper running-zone of a chain 8 wound around a front gear 5

and a rear (small) gear 7.

[0013] The case main part 1A has, in the center of the gear-covering portion 6, an insertion hole 10 for a crankshaft or the like through which a crank (not shown) or the like is inserted. Moreover, the case main part 1A is provided with a flange 11 for covering the chain 8 or the like, which extends from the lower portion of the gear-covering portion 6 via the outer periphery of the front portion, toward the upper-edge of the rear portion of the chain covering portion 9, and is bent toward the inner side, that is, toward the pedal cycle body 2 side. Rear-portion fixing-holes 12 which are long in the front and back direction are provided in the rear end portion of the chain-covering portion 9.

[0014] Moreover, the gear-covering portion 6 is provided with stripe protuberances 13 and 13 which have a rib shape and are formed for positioning in the front and rear direction. The stripe protuberances 13 and 13 are formed on the inner side of the flange 11, at the upper and lower opposed positions, and so as to extend orthogonally to the edges of the flange 11. Moreover, fixing holes 14 and 14, which are long in the front and rear direction, are formed in the flange 11 on the rear side of the stripe protuberances 13 and 13 (see Fig. 3). The notch 3 of the case main part 1A is formed so as to extend from the rear

side of the insertion hole 10 to the outer edge of the case in a continuous L-character shape. The surfaces of the case on both of the upper and lower sides of the notch 3 are depressed to some degree. Thus, closing-member fitting concave portions 15 and 15 are formed. The closing member 1B is fitted into the concave portions 15 and 15 from the outer side. In this case, the outer surface of the closing member 1B is flush with the outer surface of the gear-covering portion 6 of the case main part 1A (see Figs. 5 to 7).

[0015] The closing-member fitting concave portions 15 and 15 are provided with locking holes 16 which are positioned in the vicinity of the step between the concave portions 15 and 15 and the gear-covering portion 6, and are long-holes as locking portions for the closing member. An ejecting portion 17 is formed on the rear side of the closing-member fitting concave portion 15 so as to extend downward from the chain-covering portion 9. This is effective in preventing the shoes of a driver from coming into direct contact with the rear end of the closing member 1B, so that the closing member 1B can be prevented from dropping out. The ejecting portion 17 can be omitted. Thereby, the notch 3 can be formed so as to extend straightly.

[0016] The size, that is, the width of the notch 3 is set to be larger than the size in cross-section of a crank, so that the crank can be inserted through the insertion hole 10

via the notch 3 from the outer side of the case. Thus, the crank having a pedal attached thereto is fixed to a crankshaft, and in this state, the case main part 1A can be attached to (after-mounting) or detached from the body of a pedal cycle. As shown in Figs. 5 and 8, the closing member 1B has a flat-plate shape. Locking protuberances 18 having a hook shape, which are locked portions, are formed on the inner surface of the closing member 1B. The front edge 19 of the closing member 1B has the same radius of curvature as the insertion hole 10. Thus, the front edge 19 coincides with the circumferential edge of the insertion hole 10.

[0017] The half-face chain case 1 has features in that the main part 1A is formed according to the method of the present invention. The case 1 has no faults called "welds" having a linear pattern, and is finished to have a good appearance. Also, the half-face chain case 1 can be mounted to the body 2 of a pedal cycle, as shown in Fig. 4. First, the gear-covering portion 6 is positioned on the outer side of the large gear, in such a manner that the crank is inserted through the notch 3 from the outer end thereof into the insertion hole 10 of the case main part 1A.

[0018] Subsequently, the gear-covering portion 6 is fixed to a boss 20 formed in the top portion of a body lower frame 2A which rotatably supports the crankshaft 4, via a fixing piece 21, using the fixing holes 14 and screws 22 or the

like. On the other hand, the rear end portion of the chain-covering portion 9 is fixed to the back fork 2B of the body 2 via a stay 23 using the rear fixing holes 12 and screws 24 or the like.

[0019] Subsequently, the closing member 1B is fitted in the closing-member fitting concave portion 15 in such a manner that the locking protuberances 18 are inserted into the locking holes 16 of the case main part 1A to be locked. Thus, the fixing work is finished. It is to be noted that the fixing piece 21 has a substantial L-character shape. A fixing hole 25 to be inserted onto the boss 20 is formed in the center of the fixing piece 21. Case fixing ears 26 bent at a right angle toward the case outer surface side are formed in both of the end portions of the fixing piece 21. The ears are provided with tapped holes (not shown). The gear-covering portion 6 of the case main part 1A is fixed by means of the screws 22 or the like. Moreover, the stripe protuberance 13 for positioning the gear-covering portion 6 in the front and rear direction comes into contact with the edge on the front side of the fixing ears 26. Thus, the case 1 is positioned in the front and rear direction with respect to the bicycle body 2.

[0020] According to the first embodiment, the chain case 1 can be obtained, which has no faults called "weld", i.e., has a good appearance, and which can be attached or detached

from the body in the state that the crank having a pedal mounted thereon is fixed to the body. The colors of the case main part 1A and the closing member 1B can be optionally changed. Thus, the chain case 1 having a good design and an aesthetical appearance can be obtained.

[0021] Figs. 9 to 14 show a second embodiment of the present invention. In the chain case 1 of the second embodiment, the notch 3 of the case main part 1A is formed in a straight line shape. Closing-member locking portions 27 and 27 are formed on both of the sides of the notch 3 and on the rear side thereof. The closing member 1C is provided with an edging ring 28 having a substantial ring stripe shape which edges the insertion hole 10 for the crankshaft 3 or the like, and with two locked portions 29, 30, and 31. The second embodiment is different from the first embodiment in these points. No closing-member fitting concave portions are provided on both of the sides of the notch 3. The outer surface of the gear-covering portion 6 is an even surface.

[0022] The locking portions 27 and 27 have a substantial key-shape. Each of the outsides of the portions 27 and 27 functions as an arc-shaped guide surface 27A, and a locking concavity 27B is formed in the front end of the guide surface 27A. The locking portions 27 can be deflected toward the notch 3 side. Accordingly, notch portions 32 and 32 into which the locked portions 31 are inserted and locked

are formed on the upper and lower sides of the locking portions 27 and 27. In the closing member 1B, a cover portion for covering the notch 3, 32, and 32 and the edging ring 28 are integrally formed. The locking portions 29 having a L-character shape as seen from the side is formed in the middle portion, on the inner surface, and on the front end of the edging ring 20. The locked portion 30 (see Fig. 12) is formed on the inner surface of the cover portion, on the front side, and at the center in the upper and lower width direction, and has a T-character stripe shape, as seen from the front side, which can be inserted through the notch 3 and locked on the inner side and on both of the sides of notch 3. The locked portion 31 having a gate-shape as seen from the front side, is formed on the rear side of the locked portion 30 to be inserted into the locking concavities 27B and 27B and be locked. The components similar to those used in the first embodiment are designated by the same reference numerals as in Figs. 1 to 8.

[0023] According to the second embodiment, the case main part 1A has no faults called "weld", i.e., high qualities, due to the below-described production method, as in the first embodiment. The case main part 1A can be mounted to the bicycle body 2 in the same manner as in the first embodiment. The closing member 1B is fitted on a crank or the like in advance, or is fixed to the case main part 1A

while the pedal is removed.

[0024] That is, the inner surface of the closing member 1B is pushed on the outer surface of the case main part 1A in such a position that the locked portion 30 does not interfere the locking portion 27, as shown by a two-dot chain line in Fig. 10. Then, the closing member 1B is slid toward the front side in such a manner that the central portion of the locked portion 30 is inserted into the notch 3. Thereby, the locked portion 29 comes into contact with the end-edge of the insertion hole 10 of the case main part 1A to be locked. Simultaneously, the gate-shaped locked portions 31 and 31 come into contact with the arch-shaped guide surface 27A, so that the locked portions 31 and 31 are deflected toward the inner direction in the opposition to each other, and thus, are inserted into the locking cavities 27B to be locked.

[0025] As seen in the above-description, the closing member 1B can be fixed to the case main part 1A simply, assuredly, and strongly by one-touch operation. In the case where the closing member 1B is detached from the case main part 1A, the locking portions 27 and 27 are deflected toward the inner direction in the opposition to each other. Thereafter, the closing member 1B is slid toward the rear side, and thereby, the closing member 1B can be easily removed. Figs. 15 and 16 show a third embodiment of a half-face chain case

101. The third embodiment is different from the first embodiment in that the case main part 1A is provided with upper and lower covering portions 9A and 9B for covering the upper and lower chain-running zones, respectively. The notch 3 is straightly extended from the rear side of the gear covering portion 6 toward the rear side, so as to section into upper and lower chain covering portions 9A and 9B. The third embodiment has the same advantages as the first embodiment excepting for the function of covering the lower chain-running zone. Thus, the component similar to those in the first embodiment are designated by the same reference numerals in Figs. 1 to 8. The detail description is not repeated.

[0026] The case main part 1A of the third embodiment is molded by the method of producing a case of the present invention which will be described below. Thus, a case 101 having no faults called "weld", i.e., high qualities can be obtained. Hereinafter, an embodiment of the method of producing a case of the present invention will be described with reference to Figs. 17 and 18.

[0027] Fig. 27 shows the transverse cross-section of a core 33, a injection port (gate) 34 for injecting synthetic resin melt into a mold-cavity, and the flow of the melt, which are presented when the case main part 1A of the first embodiment is injection-molded. Fig. 18 is a longitudinal cross-

sectional view of a metallic mold 35, corresponding to the cross-section taken along line A-A in Fig. 17. The metallic mold 35 comprises a lower-side female die 36 which is positioned on the lower side, and forms the outer surface of the case main part 1A, a male die 37 which is positioned on the upper side, and forms the outer surface of the case main part 1A, and the core 33 for forming the insertion hole 10 for a crankshaft or the like and the notch 3.

[0028] The resin melt injection port 34 through which the resin melt is injected into the cavity 38 defined by the female die 36 and the male die 37 is positioned in the center of the cavity, since the gate balance is good at the position. Thereby, a product having an even thickness can be obtained. Moreover, the core 33 integrally defines an insertion hole portion 33A and a notch forming-portion 33B. A part of the cavity for forming the gear-covering portion 6 is intercepted by the notch-forming portion 33B of the core 33.

[0029] Referring to the production of the case main part 1A by the method of the present invention, first, as shown in Fig. 18, the male die 37 is fitted into the female die 37, and then, the core 33 is inserted to form the cavity 38. Thereafter, resin melt is injected into the cavity through the resin melt injection portion 34. As for the flow of the resin melt in the cavity 38, the resin melt flows from the

central portion in the front and back direction, and moreover, flows, in a uni-direction, around the core 38 for forming the insertion hole 10 for a crankshaft or the like.

[0030] Therefore, it is prevented that the resin melt flows are opposed and collide with each other. A linear pattern called "weld" is not formed. Thus, the gear-covering portion 6 and the chain-covering portion 9 having uniform properties can be attained. The position of the resin melt injection port 34 may be set at 34A in Fig. 17 which is in the vicinity of the notch 3 of the gear-covering portion 6, or at 34B in Fig. 17 which is in the vicinity of the rear end of the chain-covering portion 9. If the resin melt is injected into the cavity 38 through the resin melt injection port 34A, the resin melt flows in a uni-direction as shown by dotted line arrow b in Fig. 17. Thus, the collision in opposition of resin melt flows can be prevented, and no welds are generated. If the resin melt is injected in the cavity 38 through the injection port 34B, the resin melt flows in a uni-direction as shown by two-dotted chain line arrow c in Fig. 17, and hence, no collision in opposition of resin flows occurs.

[0031] In the case where the case 101 of the third embodiment is produced by the method of the present invention, preferably, the resin melt injection port 34 is set at one of a front-end position 34A, and rear-end

position 34B and 34C, as shown in Fig. 16. Thereby, the resin melt flows in a uni-direction, and the collision in opposition can be prevented. In the above-described embodiment of the production method, the core 33 of the metallic mold 35 is separately built in. A part of the female die 36 or a part of the male die 37, which is equivalent to the core 33, may be formed as a core portion integrated with the dies 36 or 37. Also, the insertion hole portion 33A and the notch forming-portion 33B may be divided and built-in.

[0032] In the first to third embodiments, the notch 3 is positioned on the rear side of the gear-covering portion 6. However, the notch 3 may be provided at an optional position in the gear-covering portion 6, e.g., on the front side of the gear-covering portion 6. The case can be formed so that the collision in opposition of resin melt flows can be eliminated at molding. Thus, the design can be appropriately changed. In the embodiments of the winding-around type transmission member case of the present invention, the chain case 1, 101 comprising the case main part 1A having the notch 3 and the closing member 1B is described. The present invention can be applied to a half-face chain case comprising the case main part 1A only in which the notch 3 is not closed, and, moreover, the right and left split-members of an overall-face case or the like.

Also, the present invention can be applied to different types of winding-around type transmission member cases of bicycles and tricycles.

[0033] Moreover, in the second embodiment, a closing member having no edging ring can be adopted. The closing member 1B can be fixed to the case main part 1A by a fastening means such as screws or like or by other locking means. The shape and size of closing member 1B can be optionally set, the coloring is optional, and a unique design may be adopted.

[0034]

[Advantages] In the winding-around type transmission member case of the present invention, the main part of the case is provided with a notch extending from a part of a insertion hole to the outside edge of the case, the insertion hole being formed in the center of a front gear covering portion so that a crankshaft or the like is inserted through the hole. Therefore, the case has no faults called "weld", i.e., has good appearance. The qualities and the commercial value are high. The service life can be significantly increased, due to no generation of welds which will cause the formation of cracks. The notch of the case body is set at such a size (width) that a crank can be inserted through the insertion hole. Thus, the case can be attached (after-mounting) while the crank having a pedal is fixed on the body. Accordingly, the working efficiency of the attachment of the case can be

enhanced.

[0035] In the method of producing the winding-around type transmission member case, a core or a core portion of the female-male molds for forming an insertion hole for the insertion of a crankshaft or the like in the front gear covering portion is provided with a core part, linked to the core or the core portion, for forming a notch extending from a part of the insertion hole to the outside edge of the case, and the synthetic resin melt is caused to flow around the core or the core portion of the female-male molds in such a direction that the resin melt is prevented from colliding with itself in opposition. The generation of welds in a linear pattern can be prevented. The winding-around type transmission member case having an aesthetic appearance, a long service life, and a high commercial value can be produced.

[Brief Description of the Drawings]

[Fig. 1] Fig. 1 is a side view showing the outer surface of a chain case according to a first embodiment of the present invention.

[Fig. 2] Fig. 2 is a side view showing the back (inner) surface of the first embodiment.

[Fig. 3] Fig. 3 shows the lower side of the first embodiment in Fig. 2.

[Fig. 4] Fig. 4 is a side view of the case of the first

embodiment which is mounted to the body of a bicycle.

[Fig. 5] Fig. 5 is a side view showing the outer surface of the case of the first embodiment which is disassembled.

[Fig. 6] Fig. 6 is an enlarged cross-sectional view taken along line A-A in Fig. 5.

[Fig. 7] Fig. 7 is an enlarged cross-sectional view taken along line B-B in Fig. 5.

[Fig. 8] Fig. 8 is an enlarged view taken in the direction represented by arrow C in fig. 5.

[Fig. 9] Fig. 9 is a side view showing the outer surface of a chain case according to a second embodiment of the present invention.

[Fig. 10] Fig. 10 is a side view showing the back (inner) surface of the second embodiment.

[Fig. 11] Fig. 11 is an enlarged cross-sectional view taken along line D-D in Fig. 10.

[Fig. 12] Fig. 12 is an enlarged cross-sectional view taken along line E-E in Fig. 11.

[Fig. 13] Fig. 13 is an enlarged cross-sectional view taken along line F-F in Fig. 11.

[Fig. 14] Fig. 14 is a side view showing the inner side of the case of the second embodiment which is disassembled.

[Fig. 15] Fig. 15 is a side view showing the inner side of a chain case according to a third embodiment of the present invention.

[Fig. 16] Fig. 16 is a side view showing the outer surface of the case of the third embodiment which is disassembled.

[Fig. 17] Fig. 17 illustrates an example of a method of producing of producing a case according to the present invention.

[Fig. 18] Fig. 18 is a cross-sectional view (corresponding to the cross-sectional view taken along line G-G in Fig. 17) of an elementary part of a metallic mold which is used in the embodiment of the production method.

[Fig. 19] Fig. 19 is a side view showing the back (inner) surface of a conventional half-face chain case.

[Fig. 20] Fig. 20 is an enlarged cross-sectional view taken along line H-H in Fig. 19.

[Fig. 21] Fig. 21 is a cross-sectional view (corresponding to the cross-sectional view taken along line H-H in Fig. 19) of a part of a conventional metallic mold which is a gear forming part.

[Reference Numerals]

1; half-face chain case

1A; case body

1B; closing member

2; bicycle body

3; notch

4; crankshaft

5; front gear

6; gear covering portion
8; chain
9; chain covering portion
10; insertion hole for crankshaft or the like
16; locking portion (hole)
18; locked portion (locking protuberance)
27; closing member locking portion
27B; locking concavity
29; locked portion
30; locked portion
31; locked portion
33; core
33A; insertion hole portion
33B; notch forming portion
35; metallic mold
36; female mold
37; male mold
38; cavity
101; half-face chain case